

REMARKS

The drawings have been objected to and applicant submits herewith two replacement sheets fully responsive thereto. In the first replacement sheet FIG. 3 is amended to include reference to the radial direction 16. In the second replacement sheet FIG 4 is amended to include reference to both the radial direction 16 and the axial direction 19. The Examiner is requested to accept these replacement sheets and the amendments to the claims in order to place the application in condition for allowance, or in the alternative, to place the application into better form for review upon appeal.

All of the claims 8-10 and 12 have been finally rejected under Section 103 based on new grounds: Lee '003 in view of Lee '110. Claim 10 is amended herein to more clearly present the claimed subject matter. With regard to the rejections under Section 103, allowance is requested in view of the above amendments and the following remarks.

In the prior office action claim 8, the only pending independent claim, was rejected under Section 102 based on Lee '003. As explained at col. 6, lines 6-14, Lee '033 discloses cooling or micro channels 20 which in cross section "may be in the form of ... a rectangle, a circle, a triangle ... that will allow cooling fluid to flow [col. 6, lines 9-12]." Responsive to the Examiner's rejection the applicant amended claim 8 and did distinguish over Lee '033 by reciting, as part of the then-claimed combination,

"a coating on the substrate surface; and
... cooling passages at least partly formed through the substrate surface and
extending into the substrate, and partially adjoining the coating
... wherein at least one cooling passage includes an undercut within the substrate
relative to the substrate surface."

Now, the new grounds of rejection are based on disclosure in the '110 reference of a groove 52 having a dovetail cross section as shown in FIG. 4 of the reference. The final office action refers to such grooves as cooling passages, but it would be inappropriate to read the cooling passages of claim 8 on such open grooves because the '110 expressly discloses different structure as coolant passageways 46. Specifically, col 3, lines 21-39 of the '110 reference explain that, with respect to the outlet 50 of a cooling passageway 46, the "passageway air 53 exiting the outlet 50 ... extends generally from the outlet 50 along the groove or grooves 52 [col. 3, lines 25, 26, 28, 29]." There is still no teaching to modify the cooling passageway 46 of the

‘110 reference or the channel 20 of the ‘003 reference to provide the claimed “undercut within the substrate relative to the substrate surface.”

For this reason the claimed combination could only result from an improper reconstruction of the ‘003 and ‘110 references. None of the prior art teaches or suggests applicant’s claimed “at least one cooling passage [that] includes an undercut.”

Claim 8 has also been amended to more expressly define a second difference which fully distinguishes over the combination of the two references. Even if it were possible to read the claimed passage on the groove 52 of the ‘110 reference, the combination still could not result in the cooling passage of claim 8 which now requires:

“cooling passages at least partly formed through the substrate surface and extending into the substrate, and partially adjoining the coating so that portions of the cooling passages along the substrate surface are closed off...

wherein at least one cooling passage includes an undercut within the substrate relative to the substrate surface [Emphasis Added].”

That is, the combination does not meet the above terms because, even if the grooves 52 of the ‘110 reference were found to be passageways, these grooves are not “closed off” by an adjoining coating.

Any effort to reconstruct the invention with the ‘110 reference would be inconsistent with that reference because an enclosed (closed off) passageway 46 is also disclosed in the reference ‘110 reference and there is no teaching to reconstruct this enclosed passageway with a groove.

Furthermore, as previously argued, Lee ‘033 actually teaches away from the claimed subject matter by showing triangular-shaped cooling passages that are placed only half way into either the bond coat surface (FIG. 6) or the substrate surface (FIG. 4). This arrangement greatly reduces the surface area that is available for bonding to the overlying layer. In contrast, the present claim 8 is directed to an undercut cooling passage as shown in Figure 5 of the present application that minimizes the loss of substrate surface area that is available for bonding to the above-lying coating, yet at the same time locating the enclosed cooling passage directly at the surface to maximize the cooling efficiency. It is only applicant who teaches this inventive subject matter.

In summary, the primary reference teaches away from the claimed combination and the secondary reference is inconsistent with the combination because it discloses passageways 46 as

well as grooves 52 which cannot substitute for the passageways 46. The grooves are not enclosed cooling passages.

Claims 9, 10 and 12 are also distinct and non-obvious over the prior art. The combination of limitations in claim 9 includes the additional feature of having "at least one cooling passage ... at an angle with respect to the radial orientation." According to the combination of claim 10, the coolable layer "extends in a radial direction and at least one cooling passage is positioned in an axial direction relative to the radial orientation." According to claim 12, "at least one cooling passage is arranged at least partially within the coating." These combination of features are lacking from the cited prior art.


Conclusion

Applicant respectfully requests allowance of the present application in view of the foregoing remarks and amendments.

The commissioner is hereby authorized to charge any appropriate fees due in connection with this paper or credit any overpayments to Deposit Account No. 19-2179.

Respectfully submitted,

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Two sheets of drawing enclosed